

The Calcutta University Magazine

CONTENTS.

The Tip of a Match -

History.

Manufacture.

Properties of some of the ingredients of matches.

Concluding Remarks.

The Philosophy of space. -

The University of Nadia. -

History of Nadia (from about 600 A. D.)

A University established at Nadia.

Professors of Logic in the University of Nadia. -

Basudeva Sarvaśhastra.

Ragunath Sircar.

A Word to the Wise. -

The Problem of Education.

What's in Games? -

A few lessons of a short trip to England. -

Notes and Comments.

Calcutta University Intelligence. -

PUBLISHED BY

THE CALCUTTA UNIVERSITY INSTITUTE.

1-2, College Square.

WILKINS PRESS,
COLLEGE SQUARE, CALCUTTA.

THE Calcutta University Institute.

Session - 1907-8.

This Institution consists of Three Classes of Members, viz., (a) Undergraduate Members, (b) Graduate Members, and (c) Senior Members.

The work of the Institute is divided into three Sections - (1) A Section for Athletic Exercises; (2) A Section for Mental Culture; (3) A General Section for Moral improvement.

Election of Members.

1. All students of Colleges affiliated to the Calcutta University are eligible for election as Under-graduate Members.

2. All graduates of any University are eligible for election as Graduate Members.

3. The Under-graduate and the Graduate Members are called Junior Members of the Institute. Young men of good character outside the University are not barred from joining the Institute as Junior Members.

4. Teachers in any institution affiliated to the Calcutta University, or gentlemen holding a responsible position who are interested in education may be elected as Senior Members of the Institute.

5. All Junior Members must pay in advance a subscription of not less than one rupee a year, and all Senior Members a subscription of not less than Rs. 5 a year.

6. Candidates for election as Senior members must be proposed by one and seconded by another Senior member, and elected by the Executive Committee.

7. Candidates for election as Junior Member must produce a certificate of their eligibility signed by the Principal or Professor of a College, or a member of the Senate of the Calcutta University, or a Member of the Executive Committee of the Institute.

Privileges of Membership.

All members of the Society are entitled (a) to use the Library and Reading-room of the Institute which is kept open every week-day from 1 P. M. to 7-30 P. M., (b) to take out books from the Library on making a deposit of Rs. 2, one book being taken out at a time and retained not more than three weeks, (c) to take part in such meetings and movements as the Secretary may succeed in organizing with the co-operation of the members, (d) to join the Ping-Pong, Tennis Club, the Rowing Club, the Institute Gymnasium, &c., subject to special conditions that may be laid down in each case.

THE Calcutta University Magazine.

Vol. XV. Nos. 4 & 5.

NOVEMBER & DECEMBER 1907.

THE TIP OF A MATCH.

(A lecture delivered by Rai Chuni Lal Bose Bahadur M. B , F. C. S ,
at the Science Association, under the auspices of the Calcutta
University Institute, on 30th September 1907).

History.

Among the discoveries which have very materially helped the progress of modern civilization, that of matches occupies an important position. My young friends assembled in this hall to-night will hardly realize the inconvenience from which our ancestors, two generations ago, suffered for want of this now very common domestic article. One of the chief household duties of our grandmothers and great-grandmothers, in their young days, was to prepare sulphur-tipped match-sticks from splintered jute-stems (*pat-kali*) ; and every family was provided with a tinder-box containing a piece of flint, a small iron bar and a piece of *sola* for generating fire. Owing to the difficulty of producing fire, each time it was required, from the flint, they used to keep fire ready in the house, especially during the night, by allowing husks of rice to burn slowly in an earthen pot from which they could at once get a light by plunging the sulphur-tipped sticks into the hot mass of ashes. It was a very feeble fire indeed, but it was not readily extinguished. Itinerant vendors of these sulphur-tipped match-sticks were to be commonly found in the streets of Calcutta about 40 years ago.

It is not known at what period of the world's history nor by whom fire was first artificially made. In the oldest records of Aryan civilization, viz., in the Vedas, we find that fire was an object of worship to the first Aryan settlers of India and that its powers for good and evil

were well understood by them. We also read in the Vedas of the custom of keeping a fire continuously burning in some secluded spot in the family-dwelling-house for the daily performance of certain religious rites, and this fire was handed down as a sacred legacy from father to son. This custom was also prevalent among the earlier Christians, and it is still extant among the Parsee community in India. It is said that the Parsees brought some consecrated fire from their native land at the time of their first settlement in India more than 1000 years ago and this fire is still vigorously burning in their small white temples in the Bombay Presidency. Grecian mythology attributes the knowledge of the use of fire to Prometheus who is said to have stolen it from the gods. The Greeks knew how to produce fire by the use of lenses and mirrors. The burning of a Roman fleet before Syracuse is said to have been effected by the use of burning mirrors. The Egyptians knew the use of fire for extracting metals from their ores and for burning their pottery from a very early age, and representations of furnaces and appliances used by them for these purposes are still to be found well-preserved on their monuments erected more than five thousand years ago.

Long before the time-honoured tinder-box came into general use, people used to produce fire by rubbing together two pieces of dry wood or by the friction of two stones ; and the practice still prevails among some aboriginal tribes. In Europe, the tinder-box held its sway throughout the middle ages and up till the beginning of the 19th century when it began to be gradually displaced by various ingenious inventions involving physical and chemical methods of producing fire, which may be truly considered as the predecessors of the present matches. Dobereiner's Platinum lamp was invented in which fire could be produced at a moment's notice by the absorption of Hydrogen gas by Platinum ; and fire-syringes came into existence by which a piece of tinder could be made to glow by the heat produced by the sudden compression of air in the syringe.

Experiment—The action of Dobereiner's lamp and of the fire-syringe shown.

Yellow Phosphorus was discovered by Brand of Hamburg in 1669. Spasmodic attempts were now and then made to utilise the ready

inflammability of yellow phosphorus for obtaining a fire, but this substance did not come into general use for more than a century and a half after its discovery, chiefly on account of its dangerous character.

In 1805, Chancel of Paris first prepared Chlorate of Potassium matches which had to be ignited by dipping the tips in strong Sulphuric acid kept in a separate phial. These matches were called *Oxymuriate* or *Chemical matches* and were sold at the rate of one hundred per florin. Their igniting composition consisted of a mixture of Chlorate of Potassium, sugar and gum, forming an explosive compound which bursts with violence into a flame when dipped in strong Sulphuric acid. I have prepared a few such matches and you will see how they are inflamed when I plunge the sticks into strong sulphuric acid contained in this glass phial.

Experiment—Dip a Chlorate of Potassium match into asbestos soaked with strong Sulphuric acid.

In 1827, the first friction matches, called lucifer matches or congreves, after the name of Sir William Congreve, were prepared by John Walker of England. The tips of these matches were made of Chlorate of Potash and Antimony Sulphide; they needed no chemicals, such as Sulphuric acid, to ignite them but could be inflamed by being rubbed on the sand-paper supplied with the box. A shilling was charged for a box of 84 matches.

In 1833, the real lucifer matches containing yellow phosphorus were first manufactured on a commercial scale in Austria, and the industry was for a long time confined to that country and the South German states. Great improvements have since been effected not only in their igniting composition, but also in their out-put and finish by the introduction of various labour-saving machines.

There are however certain disadvantages in the use of yellow phosphorus in the manufacture of lucifer matches. The yellow phosphorus being readily inflammable, these lucifer matches have been known to cause accidental fires. Then again yellow phosphorus is a powerfully poisonous substance and the workers in the lucifer-match factories were found to suffer much from a kind of bone-disease, chiefly affecting the lower jaw, which was attributed to the inhalation of phosphorus vapour in the process of manufacture. The condition of

things has since then considerably improved by the introduction of well-organised sanitary measures and the disease is very much less common now than in former years. In Denmark and Switzerland, the use of lucifer matches was however prohibited by acts of Government more than twentyfive years ago.

All these inconveniences have since been removed by the use of the non-inflammable variety of Phosphorus, called the red or amorphous phosphorus, which was discovered by Schroter in 1845. It was Lundström of Sweden, who in 1855, first manufactured the real safety-matches which ignited when rubbed against the specially prepared rubbers pasted to the sides of the box. The tips of these matches contained no phosphorus but the rubber on the side of the match-box was made of a thin coating of red phosphorus and glue. Lucifer matches have now been largely superseded by the safety matches.

Manufacture.

In giving a description of the manufacture of matches, I have followed closely the arrangement given in Thorpe's Applied Chemistry from which I have obtained much help. This has been supplemented by observations from personal inspection of plants and factories.

The four principal operations in the manufacture of matches, lucifer or safety, are (1) splint-cutting, (2) dipping, (3) drying and (4) boxing. There are however several minor operations involved in the process which will also be briefly noticed.

Kind of wood used.—The splints are generally made of some kind of pine wood. In England, the white Canadian pinewood is almost exclusively used for this purpose. In Sweden, Aspen is most commonly used. Other varieties of wood such as Poplar, Birch, Beach, Willow, Deal, Cedar, Linden &c, are also used on the continent.

Scurfing.—In English factories planks about 12ft in length, 3 inches thick and 11 inches wide, are first smoothed. This process, known as *scurfing*, is done by machinery.

Cross-cutting.—These cleaned planks are then cut by a machine into blocks usually 4½ inches long, which are equal to twice the lengths of English match-splints.

Steaming.—If the wood is too dry, it must be exposed to steam for a short time.

Splint-cutting.—These blocks are then introduced into a splint-cutting machine of which there are many forms. The kind of machine mostly used in English factories is known as the *flaking* machine which is provided with a vertical slicing knife by which the blocks of wood are first cut into flakes of the required thickness and then turned into splints double the length of a match-stick ; these are then passed on to a table from which they are collected and removed for further operations. One of these machines can turn out 17 million match-splints per day.

There is another kind of machine called the “toothing” machine which works well with soft pinewood. This machine is provided with cutters consisting of vertical lancet-points or teeth, which score or groove the surfaces of the blocks to a depth equal to the thickness of a match and the grooved portions are then sliced off by a horizontal knife and fall as match-splints.

In Sweden, Germany and in Japan, the splints are made from round blocks of wood which are made to revolve on a turning lathe and a continuous thin band of wood of the thickness of a match is cut off from the revolving block by a fixed-knife. This broad band of wood at the same time is divided lengthwise by several vertical knives into smaller bands, each of a width equal to the length of a match. These smaller bands are next fed into a machine in which they are transversely cut into splints by a guillotine knife. These machines are sometimes worked by hand but more often by steam-power. When worked by hand they can turn out 5 million splints in a day and double this quantity when the machine is worked by steam-power. The Tollygunge match-factory is using this kind of machine which is at present being worked by hand and here are the splints turned out by this factory.

Experiment :—Demonstration of the different machineries by lantern slides. •

Drying the cut splints :—The next operation is that of *drying* the cut splints. For this purpose, the splints are usually loosely spread on a large tray and dried by exposure to warm dry air. In Sweden, the splints are put into wire-gauze cylinders which are made to revolve inside a stove.

Sifting : -After drying, the splints are *sifted* in a kind of sieve which process removes all fragments and splinters.

Dipping : -The next process is known as the dipping-process in which the ends of the splints are coated with the igniting composition. In the earlier days, this operation was generally done by hand ; the splints were either collected into bundles of convenient thickness, or arranged on dipping boards and the ends were first put into melted sulphur and then in the igniting mixture kept in a shallow vessel. This has been replaced by what is now known as "*Frame or Clamp-dipping*." The apparatus used for this purpose consists of sixty movable boards placed one over the other and secured in square frames with sides made of iron rods. Each board has sixty-five grooves on its upper surface, each groove accommodating a double-length match-splint which is held in position by the pressure of the felt with which the lower surface of the board is lined. One frame holds 3900 splints. These are dipped at both ends and cut in the middle, thus making 7800 matches. Three to four thousand frames can be dipped in a day by a single workman.

Various improvements have been effected in the machinery used for dipping and the "*Frame or Clamp-dipping*" just described has in many places been substituted by what is known as "*Coil or Band-dipping*" in which the splints are placed between the coils of a long tape of cotton-webbing, about the thickness of a splint and of a shorter width than the length of a splint, wound round a drum. The splints are thus placed round a drum between the coils of the tape with their two ends projecting beyond the coil which can be conveniently dipped in the igniting composition and allowed to dry in the coil.

Experiment :—Demonstration of clamp-dipping and coil-dipping by lantern slides.

After the splints have been arranged in the *clamp* or in the *coil*, they are subjected to the next process, that of *Paraffining* or *first dipping*. The projecting ends of the splints are ~~not~~ heated by bringing them into contact with a hot iron-plate and then dipped into a melted mixture of Paraffin and Stearine contained in a shallow double-bottomed iron tank kept hot by steam. The object of first coating the splints with Paraffin is to ensure the ready inflammability of the stems.

Sulphur was originally used for this purpose, but it has now been replaced in all good matches by Paraffin or a mixture of Paraffin and Stearine.

Manufacturers of safety-matches in Sweden and Belgium, to provide against accidental fires caused by the dropping of glowing match-splints, take the precaution to impregnate the stems with solutions of certain mineral salts, such as Sodium phosphate, Sodium tungstate, Alum etc. This causes the splints to cool and cease to glow immediately the flame is extinguished.

Igniting Composition :—Paraffined splints are next dipped into the igniting composition which varies a great deal with different manufacturers. It contains (1) one or more Oxygen-giving agents, (2) one or more combustible substances, (3) some cementing or binding material, (4) some inert substance to increase friction and (5) some colouring materials. In the lucifer matches of English manufacture, the Oxygen-giving agent is Potassium Chlorate, either used alone or mixed with Manganese Dioxide. In the Continental matches, Nitrate of Potassium, Nitrate of Lead, Red Lead, Potassium Bichromate &c., are used either with Chlorate of Potassium or as a substitute for it. The combustible substance in all good lucifer matches is Yellow Phosphorus. The cementing material is usually glue, but gum, gelatine or dextrine is some times used in place of glue. The inert substance which is used to ensure increased friction is either fine sand or glass-powder. Various substances are used to colour the tips of lucifer matches ; the colouring materials usually employed for this purpose are Prussian blue, Ultramarine, Magenta, Vermillion, Smalt, Chrome yellow &c. The tips of safety-matches are as a rule not coloured artificially.

The operation of dipping is done in a separate room called the "*Dipping room*." The ingredients are made into an emulsion and spread to the required depth, over the dipping table which consists of a shallow flat-topped iron box into which steam can be admitted to keep it hot. The ends of the splints, held in the *clamp* or *coil*, are plunged into the emulsion and then placed on racks with the tipped ends downward in order that the tips may take a good rounded form, after which the other ends of the splints are dipped and similarly treated.

The dipping is usually done by hand, but machinery has also been used for coating the splints with the igniting composition.

Drying :—The prepared splints are next subjected to the process of *drying*. For this purpose, the double-tipped splints in *clamps* or *coils* are supported on racks either in the open air when the weather permits it, or in drying rooms kept warm and dry by steam or by hot air carried round the room in pipes.

Laying out, and halving and boxing :—The dried splints are next taken out by hand from the *clamps* or *coils* and laid out for the purpose of cutting them into halves, which is technically known as "*halving*" or "*cross-cutting*". This is usually effected by the lever cutting-knife. The cut matches are finally put into boxes by hand, although machines have from time to time been introduced even to box the matches.

Safety-matches :—In the case of safety-matches, the process of manufacture is the same, excepting that the igniting composition and the rubbers are different from those used in the case of lucifer matches. In these, the yellow phosphorus is substituted by antimony sulphide in the igniting composition, and red phosphorus is used for the preparation of the rubbers spread over the sides of the box. The mixture of antimony sulphide and chlorate of potash is not sufficiently sensitive to be ignited by any ordinary friction but inflames at once when rubbed upon the amorphous phosphorus which coats the rubbers on the sides of the box. Various modifications as regards the nature and proportion of the oxidising and oxidisable substances in the igniting composition have been introduced by different manufacturers. The composition used by Lundström, the first manufacturer of safety-matches, which has been patented by Bryant and May, the celebrated match-manufacturers of England, is given below :—

(1) Igniting composition :—

Antimony sulphide	...	...	2.3 parts.
Potassium Chlorate	...	...	6 "
Glue	...	...	1 part.

(2) Rubber :—

Red phosphorus	...	...	10 parts.
Antimony sulphide	}	...	8 "
or			
Manganese dioxide	}	...	...
Glue	...	...	3 to 6 parts.

Rubber.—The composition of rubbers for lucifer-matches is made of a mixture of sand or glass powder and glue or gum, spread on both sides of the match-box ; but these can be ignited when rubbed against any rough surface.

For safety-matches red phosphorus with antimony sulphide or manganese dioxide is mixed with glue to the required consistence, and this is spread over the sides of the box.

Match-boxes.—These are also made of pine-wood and are turned out by machines. Ribbon-like slices of wood of the required thickness and width are first prepared and these are then *scored* along the lines in which they must be bent into the box form. Sometimes moulds are used for preparing the boxes.

The folding of the slices into boxes, covering the boxes with paper, labelling, and covering the sides of the boxes with the rubber-composition, are done by hand.

Properties of some of the ingredients of matches.

So far we have seen that the two most active ingredients of the igniting composition of matches are (1) Phosphorus and (2) Chlorate of Potash.

There are two kinds of Phosphorus, the ordinary or yellow Phosphorus which is used in the preparation of lucifer matches, and the red or amorphous phosphorus which is employed in the manufacture of safety-matches. Ordinary phosphorus is obtained from bone-ash which consists almost entirely of Calcium Phosphate ; and the red variety may be obtained from the ordinary phosphorus by heating it strongly, out of contact with air, in an atmosphere of carbon dioxide gas. These two varieties of phosphorus differ widely from each other in their properties. The ordinary phosphorus is almost colourless, transparent and wax-like ; the other is a chocolate red powder. Ordinary phosphorus fumes in the air and emits light in the dark ; these properties are absent in the red variety. Ordinary phosphorus is inflammable, and it should, therefore, be very carefully handled. It readily combines with the oxygen of the air and hence it is always kept under water. The red phosphorus is not inflammable unless

strongly heated. Ordinary phosphorus has a garlic-like odour; red phosphorus is odourless. Ordinary phosphorous is very poisonous; the red variety is devoid of toxic properties. Ordinary phosphorous is soluble in Carbon disulphide, Benzene, Chloroform, Olive oil &c.; the red phosphorus is insoluble in any of these liquids.

It will thus be seen that lucifer matches are dangerous because ordinary phosphorus is used for their manufacture. I propose to make a few experiments to illustrate some of the properties of the ordinary phosphorus.

I. It is readily inflammable :—

Exp. Put a piece of phosphorus on a porcelain plate and touch it with a heated iron rod ; it bursts into a bright white flame.

If phosphorus is burnt in oxygen, it gives a dazzling white light.

Exp. Introduce phosphorus burning on a deflagrating spoon into a bottle containing oxygen ; dazzling white light is emitted.

II. Union with other elements at the ordinary temperature:—

Ordinary phosphorus is a substance of great chemical energy and combines with many elements even at the ordinary temperature with evolution of heat and light. For instance, when it is exposed to air, it slowly combines with the oxygen of the air and appears phosphorescent or luminous in the dark. It may even take fire spontaneously when exposed to the air in very fine division. If we dissolve ordinary phosphorus in carbon disulphide and sprinkle the solution on some combustible substance, such as a piece of paper, the carbon disulphide soon evaporates leaving the phosphorus in very fine division on the piece of paper. The fine particles of phosphorus combine with such energy with the oxygen of the air, that sufficient heat is produced to inflame the phosphorus which causes the paper to take fire. The solution of phosphorus in carbon disulphide is known by the name of "Greek fire".

Exp. Sprinkle some solution of phosphorus in carbon disulphide on a sheet of paper ; the paper is seen to burn within a short time.

When brought into contact with Chlorine or Iodine, it combines with great energy with either of these elements with the production of light.

Exp. Introduce phosphorus into a bottle of chlorine gas, on a deflagrating spoon.

Exp. Bring together phosphorus and a crystal of Iodine on a porcelain plate by means of a glass rod.

III. Luminosity :—

Ordinary phosphorus becomes luminous in the dark owing to slow combination with the oxygen of the air. If we dissolve some phosphorus in olive oil, the oil appears luminous in the dark.

Exp. Paint a skull with phosphorated olive oil and expose it in a dark room.

When Phosphorus is boiled with water, it vaporises and renders the steam luminous in the dark. This property is utilised in medico-legal analysis in cases of Phosphorus poisoning.

Exp. Boil water and phosphorus in a flask to which is fixed a long glass tube in a dark room ; the tube becomes luminous.

IV. It produces a spontaneously inflammable gas with hydrogen :—

Phosphorus combines with Hydrogen and produces a gas the peculiarity of which is that each bubble of the gas as it comes into contact with air ignites spontaneously and forms a beautiful wreath of white smoke. The experiment is so interesting that I propose to perform it even at the risk of causing a little inconvenience to you on account of the unpleasant smell of the gas.

Exp. Place together a solution of caustic soda and pieces of ordinary phosphorus in a glass retort (and a little *ether* to expel the air) and lead the delivery tube into water kept in a trough ; apply heat. Phosphuretted hydrogen will be evolved which will take fire on coming into contact with air and wreaths of white smoke will be formed.

A number of interesting experiments may be made with phosphorus but I am afraid that the time at my disposal will not allow me to take them up to-night.

The principal substance which supports the combustion of phosphorus in lucifer-matches and of antimony sulphide in the safety matches is chlorate of potassium which readily parts with its oxygen when heated with an inflammable substance. It is a solid substance crystallising in white tablets and made of three elements viz. Potassium,

Chlorine and Oxygen. It is largely used in pyrotechnics, specially for the preparation of crackers and coloured fires, on account of its oxidising properties. We use it largely in the laboratory for the preparation of oxygen gas. When it is heated, it is decomposed into oxygen gas and a salt known as chloride of potassium.

Exp. Heat chlorate of potash in a test-tube and introduce a glowing chip of wood ; it will burst into a flame.

Chlorate of Potassium when mixed with combustible substances such as sulphur, sulphide of antimony, sugar etc , forms an explosive mixture which detonates when subjected to friction or percussion.

Exp. Take a few crystals of chlorate of potassium and a little sulphur in a mortar and rub them together.

Exp. Rub together gently by means of a spatula a mixture of finely powdered chlorate of potash and red phosphorus ; the mixture will explode.

Exp. Make a mixture of chlorate of potassium and antimony sulphide and wrap it up in a piece of paper ; place the packet on an anvil and strike it with a hammer. The mixture explodes with a loud report.

Many fatal accidents have occurred by the careless handling of a mixture of chlorate of potassium and antimony sulphide or sulphur in the preparation of fire-works. Ignorant people rubbing together these substances in large quantities in a mortar have been burnt to death from the sudden and violent explosion of the mixture. These substances should never be pounded together. Each should be powdered separately and then mixed gently by means of a spatula.

Chlorate of Potassium is decomposed by strong Sulphuric acid with the evolution of a yellow gas which readily parts with its oxygen and explodes with violence on the application of gentle heat or in the presence of any combustible substance.

Exp. Place a mixture of chlorate of potassium and sugar on a porcelain plate and touch it with a glass rod dipped in strong sulphuric acid ; the mixture bursts into a flame with violence.

Even under water, this action of sulphuric acid on potassium chlorate is very marked in the presence of a readily inflammable substance such as phosphorus.

Exp. In a tall glass-cylinder, put some water, crystals of chlorate of potassium and small fragments of yellow phosphorus ; pour a small

quantity of strong sulphuric acid through a thistle-funnel kept in the cylinder. The pieces of phosphorus will take fire and burn under water.

The oxidising property of chlorate of potassium is strikingly shown when the powdered salt is thrown upon glowing charcoal.

Exp. Throw some powdered chlorate of potassium on charcoal burning in a stove.

Potassium Chlorate enters largely into the composition of coloured fires which generally consist of Potassium Chlorate mixed with sulphur and some metallic compound to produce the desired colour in the flame. Thus Nitrate of strontium is used for making the red coloured fire ; oxide of copper for blue fire, and Barium chlorate or Nitrate for green fire. In preparing these fire-compositions, care should be taken that the ingredients are very finely powdered, thoroughly dried and intimately mixed.

Concluding Remarks.

A few words regarding the prospects of *match industry* in India and I shall conclude my lecture. A few years ago, the industry was first started in the suburbs of Calcutta, but unfortunately it soon collapsed for reasons not known to me. Another factory has just been started under more favourable auspices in Tollygunge. It is under the management of an expert who received his training in Japan. The other day I paid a visit to the factory, and was much pleased to see the work which is being done there. The factory is turning out matches of fair quality; the output however is not large as the machines are now being worked by hand, but they have got their engine which will soon be put to working order. The factory is experiencing some difficulty in getting the proper kind of wood for the matches; the kind of wood they are using now is not quite suitable for the purpose.

It is rather surprising that this industry had not been started in India long before. It does not require much capital; trees yielding proper kind of wood for matches abundantly grow in India, and the labour is very cheap. Reasonable hopes may even be entertained for the manufacture of raw materials in India. Any quantity of bones is available here, from which phosphorus may be prepared. Wood ashes

containing a high percentage of carbonate of potash may without difficulty be obtained on a manufacturing scale and lime is not wanting to make caustic potash from this crude material. The manganese ores of South India the source of chlorine for the preparation of chlorate of potassium from the caustic potash thus obtained. What is really wanting is the spirit of enterprise. The signs of the time are promising; a good beginning has been made in Bengal and I hope the example will soon be followed largely in this as well as in other parts of India.

Before I sit down, I beg to thank Dr. Amrita Lal Sircar, F.C.S., the Secretary of this Association, for placing the apparatus and chemicals, and the services of the assistants at my disposal for to-day's lecture; my thanks are due to Babu Haradhan Roy, M.A. and other assistants for helping me in the preparation of the experiments.

I have also to thank Major, J. A. Black, M.A., I.M.S., Chemical Examiner, Bengal, for having kindly looked over this paper.

THE PHILOSOPHY OF SPACE.

(BY AN INDIAN PROFESSOR OF PHILOSOPHY.)

I. *The Vedanta* maintains that Space (ether) is an effect, a product, and not an eternal substance. There is an elaborate metaphysical discussion on the subject in the *Vedanta-Sutras* and *Sankara's* Commentary thereon (translated by Dr. Thibaut, Sacred Books of the East series) (See II. 3, 1-7). Various arguments are advanced to prove the originated character of ether, some of which are metaphysical, others are based upon sacred texts. The important texts on which the Vedantin relies are e.g. "From that Self sprang ether" (Taitt. Up. II. 1.) "One only, without a second" (this is incompatible with the view that ether is co-eternal with Brahman) Metaphysically it is argued that ether must be an effect, because it is finite, since it is distinct from the other four elements (viz. earth, water, fire, and air) (But this seems to confuse the two meanings of ether viz. *universal space*, and *one of the five primary elements*). The argument is advanced, and discussed specially in its bearing on finite Selves, in II. 3, 7. This is in agreement with the metaphysics of Spinoza according to whom a thing that admits of definition, division or limitation, is necessarily finite, and therefore a product. Again, it is similarly argued

"Ether is non-eternal, because it is the substratum of a non-eternal quality, viz. Sound, just as jars and other things, which are the substrata of non-eternal qualities, are themselves non-eternal." This reasoning may appear strange to a student of European Philosophy according to which the impermanent (the mode or attribute) somehow inheres in the permanent (the substance or noumenon). But can the eternal and the non-eternal co-exist, in defiance of the second Law of Thought? Hence the aggregate of phenomenal things, that is, the world, cannot be an attribute of the eternal or Brahman. The non-eternal cannot come out of the eternal. What then is this world? Can it be co-eternal with the Lord? But that would be absurd, since the eternal or the infinite is necessarily *one*. This logical necessity drives the Vedantin to the conclusion that the world has no transcendent existence of its own—that it is an *illusion*, due to *Avidyá* or Ignorance.

The argument that ether must be eternal, because it is all-pervading, is not conclusive, since all-pervadingness is not a necessary or universal mark of eternality. Being the *first* in order of creation, the other four elements which were subsequently created are necessarily *in* ether, ether is necessarily their common or universal receptacle,—whence its all-pervadingness. Its all-pervadingness arising in this way, this property does not prove it to be non-originated.

Thus ether is proved to be originated. "We therefore decide, on the authority of Scripture, that the entire world has sprung from one Brahman, ether being produced first and later on the other elements in due succession" "It therefore remains a settled conclusion that, before ether was produced, Brahman existed without ether" (Thibaut, Vedanta-Sutras Part II pp 16-17.)

The subject of the metaphysical nature of ether or rather space is a fascinating one to students of theology. Theists generally admit its existence to be a *caused* or *created* one. In making extension or space to be the essence of Matter, Descartes makes it to be a *created* substance. Martineau however deprives it of *substantiality*, making it to be a purely passive existence, but at the same time makes it to be an *uncreated* one. Thus Space, according to Martineau is not originally a *material* existence, having the solidity and resistance of Matter, but is capable of becoming transformed into Matter by the operation of the Divine Cause. "If there be a condition requisite for the Divine Cause, it must from the nature of the case be already there, *i.e.* be self-existent with him. What can it be that holds this rank, and yet is not itself a cause? There are but two forms in which it is

presentable to "thought : either it is *matter*, to be moulded to the divine purpose ; or, if we strip it of solidity, it is *space*, ready to have forces thrown into any of its points"... "When, on the other hand, you cut down the co-existing datum to space alone, you have a pure *condition* which has no pretension to a dynamic character ; and the whole volume of Force has to ask for its genesis, and finds it singly in the Divine Causality" (Martineau's Study of Natural Religion, secon. Edition, Vol. I pp 381-382). Thus the assumption that the empirical world was evolved out of Space (ether), whether we regard Space, with Martineau, as the uncreated co-eternal condition of God's activity or conceive it, with the Vedantin, as the first created element, would explain the doctrine of *creation out of nothing*, as maintained by popular theology, for *nothing* is equivalent to the absolutely passive space, as conceived by Martineau and the Vedanta philosopher.

II. *The Vaiseshika* (II. 1. 19-31) Akasa is that which makes things manifest or reveals them by providing free space for them, and which subsequently re-absorbs them (things disappear in space). Thus *things come out of and re-enter into space*. Now, of that which is non-existent we cannot predicate these two inverse functions of projection and re-absorption. Hence the existence of akasa must be inferred (S. 19.)

Akasa (space) cannot be regarded as a *cause*, for a cause is necessarily *finite* and *phenomenal* (as maintained by Kantian and Post Kantian metaphysics). A cause is necessarily *prior* to its effect, (though this is denied by Martineau, see pp 139-140, Study of Religion, and by those who maintain the reciprocity of cause and effect) but space, which is permanent and endures throughout the past, the present, and the future, cannot be such a cause. Again, a cause is distinguished by both positive (*avyay*) and negative characteristics, but space does not possess any negative attribute, since it is (*vyetireki*) all-pervading (S. 21.) (That space is not an active *cause*, but only a passive *condition*, is also admitted by Martineau). But the above conclusion is the result of conceiving space in unreal abstraction from material things. As a matter of fact, space is always associated with corporeal things, so that in the causal activity of corporeal things, space is at least a co-cause with them (s. 22). For the substantiality or causality of space is evidenced by the attribute of *Sound*. An attribute cannot exist by itself, it must have a substratum. But this substratum cannot be either water, fire, air or earth. Therefore it must be ether. The reader will at once perceive the apparent absurdity of the statement that sound is not an attribute of air (air-vibrations). This objection is anticipated, discussed and finally removed in sections 25-26. We will give here one or two only of the leading arguments.

The property of tangibility of things is due to the presence of air (intervening between the object and the tactile sense). Now, if sound were a property of air, we should always experience it (simultaneously) with touch. Again, if air were the substratum of sound, we should hear it equally from two opposite directions, but as a matter of fact we hear it from one direction only, viz. that from which the wind blows. All such arguments deserve more than a passing notice, for they all tend to show that it is not air *as such*, but something in it (ether) which is the cause of air-vibrations, and thereby, of Sound. The order of succession, according to Indian Cosmogony generally, is ether, air, fire, water and earth, (the Vedanta makes fire the second product), so that whatever attributes air seems to have, in addition to its own distinctive attribute, viz. tangibility, is presupposed in and must be traced to ether, the original substance, whether created or uncreated.

Having shown that sound is not an attribute of the four *external* elements, it next proceeds to show that it cannot be an attribute of the two *internal* substances either, viz., Soul and Mind. It cannot be an attribute of the Soul, for sound is *heard*, and thus supposes a sense-organ which obviously transmits it from outside. If sound were a 'property of the Soul in the same sense as bliss and suffering are, then even a deaf man would be conscious of it. Similarly sound cannot be predicated of mind. (Mind has a different connotation in Indian Philosophy—it is the eleventh organ, superintending the operations of the ten subordinate organs, viz., the five organs of *sense* and the five organs of *action*. It corresponds to Aristotle's General or Central Sense as described in his *De Anima*). For, the properties of mind *e. g.* ascertainment, discrimination, doubt &c. cannot be perceived, but this does not apply to Sound (S. 26).

Thus by elimination, we are driven to ether as the basis of Sound (S. 27). The succeeding sections take up the question that the *directions* (the points of the compass) and *time* are but modes of space. This is a highly interesting subject, specially from the stand point of modern Epistemology. The mutual relation of Space, Time and Causality is fully discussed in the systems of such modern philosophers as Leibnitz, Kant, Helmholtz, Mill, Spencer, Martineau &c. We now take up.—

III *The Nyaya System* (which is closely related to the Vaiseshika System) according to which "ether is one, all—pervading and eternal." The following passage, quoted from Dr. Ballantyne's Lectures on the Nyaya Philosophy as epitomized in its most popular manual, the *Turkasangraha* will be found apposite. "This element (ether) is inferred, in order to

account for sound, and to provide each of the senses with a separate element. As pure air and water are devoid of odour, it seems to have been decided, by the *Nyayaikas*, that odour is the distinctive evidence of earth. The perception of savour being dependent on the presence of moisture in the mouth, it was decided that the sense of taste must be aqueous in its nature. The relation between light and vision was obvious. The air, again, having been appropriated to the sense of touch, which pervades the body just as it usually envelops it, there remained nothing for it, if the uniformity of the system was to be kept up, but to postulate a fifth elementary substance to account for hearing, and this received the name of ether" (pp. 13-14).

The eternal nature of ether is supported by the following arguments: "whatever is originated, they say, is originated from inherent [substantial or material] causes, non-inherent [non-substantial or formal] causes, and operative [instrumental] causes, of a substance belonging to the same class and more than one in number [as threads are of cloth]. But for ether there are no such originating substances, belonging to the same class and more than one in number, from which, as its inherent cause, it could originate, and consequently there also exists no non-inherent cause of ether; for the latter would have to be looked for in the conjunction of the primary substances [in the case of cloth it is the conjunction of threads]. And as there exist no inherent cause and non-inherent cause, there is absolutely no room for an operative cause; for the only function of the latter is to assist the other two causes [the operative cause, in the case of cloth, consists of the loom, the shuttle, &c. Those elements moreover which have an origin, as fire and the like, we may conceive to exist in different conditions at an earlier and a later time; we may conceive e.g., that fire, previously to its origination, did not give light or produce any other effects, while it does this subsequently to its origination. Of the ether on the other hand, no such difference between an earlier and a later period can be conceived; for, we ask, would it be possible to maintain that before its alleged origination there were no large minute and atomic spaces? That ether is without an origin further follows from its characteristic qualities such as all-pervadingness and so on, which altogether distinguish it from earth and the other elements" (Vedanta-Sutras I 3, 3, Thibaut's Translation Part II pp. 1-6, where these arguments are formulated from the Nyayaika standpoint, discussed and refuted).

IV. *The Sankhya System* makes akāsa a produced substance. According to it there are twenty-five categories, viz., (1) Prakriti or the Undeveloped

(2) the great one or Intellect (3) Self-consciousness or Subjectivity (4-14) the eleven organs, the five organs of *sense*, the five organs of *action*, and *manah* or mind, (15-19) the five subtle elements (*tanmatras*), viz. audibility, savour, visibility, tangibility and odour (20-24) the five gross elements (*mahabhutas*) viz., air, ether fire, water and earth (25) the *Purusha* or Soul. Now, of these twenty five, "The fundamental causal substance (Prakriti) is not an effect, seven (substances, viz. Intellect, Self-consciousness, and the five subtle elements) are causal substances as well as effects. Sixteen are effects only (viz. the five gross elements and the eleven organs including mind). The Soul is neither a causal substance nor an effect. (Sankhya Karika, Verse 3). The phenomenal nature of ether is supported by elaborate reasonings in *Vachaspati Misra's* commentary—the *Sankhya-tatva-Kaumudi*—on the *Karikas*. (See also Sankhya Aphorisms I. 61,—translated by Ballantyne). Each *tanmatra* or subtle element evolves its own organ and the gross element corresponding to it. Thus audibility is the cause of ether and the organ of hearing. Both the Vedanta and the Sankhya admit the phenomenal origin of ether. But according to the former, it is the most subtle of all created things, being the first created object ; according to the latter, it is preceded by other subtler evolutes, viz. its corresponding subtle element or *tanmatra* mind, self-consciousness, and intelligence. From this point of view the Sankhya seems to have arrived at a much finer degree of generalisation than the Vedanta. Philosophers of all ages and countries have employed two modes of explaining things, viz. the abstract by the concrete (employed by nominalistic and sensationalistic philosophies), and the concrete by the abstract (employed by idealistic and rationalistic philosophies). We may explain a concrete man as a particularized mode of the universal essence of humanity ; or we may explain humanity itself as the result of generalisation over concrete individual men. It will be seen that both the Vedanta and the Sankhya employ the former kind of explanation. These two forms of explanation are not really opposed but inversely related to each other like a set of telescopic tubes.

V. The *Yoga System of Pantanjali* takes essentially the same view of space as the *Sankhya*.

We will now conclude by reverting once more to the Vedanta view—a view which is held by the majority of Hindu thinkers in India, and which has produced some impression on the thinkers of Europe and America.

The phenomenal character or ideality of space is a necessary conclusion in all systems which may be characterised as idealistic or spiritualistic monism, for it is space which makes the *One* appear as the *Many* ; so that

if space were ~~real~~, the Many would be real as well (though this conclusion is somehow avoided by the metaphysics of Leibniz). But the Vedanta does allow to space a reality—a phenomenal reality—for *vyavaharic* or practical purposes. The Vedantin might say with Kant and Green that space is *empirically real*, though *transcendentally ideal*.

Space being transcendentally ideal, everything which it contains, *i, e.*, the entire empirical world, must be equally so. But transcendent ideality is not absolute fiction. The criticism that the Vedanta reduces the world to an unreal dream is only a caricature. Even dreams are true *as long as they last*, they are empirically real. This is exactly the view of the Vedanta which does allow to the world a phenomenal reality. To illustrate this truth by one of the stock analogies of the Vedanta philosophy: Brahman corresponds to the piece of rope which is, through an illusion, mistaken as a snake—the snake corresponding to the empirical world. But the snake is a reality *as long as the illusion lasts*, for it actually produces the feeling of fear, which it could not do if it were a pure non-existence, for can a pure non-existence cause or bring about the existence of something? Such then is this world—it is real for all ordinary practical purposes of life, it is real to our every-day experience though we must always remember that Brahman is the sole reality.

Being all-pervading in its nature, and having directly emanated from Brahman, ether has naturally been used in the sacred scriptural texts as a symbol of Brahman; and the Vedanta is very careful to point out that the ether metaphorically identified with the highest Brahman is to be distinguished from the elemental ether (see Vedanta-Sutras I 1, 22, and I. 3, 41).

THE UNIVERSITY OF NADIA.

BY MAHAMAHOPADHYAYA SATISA CHANDRA VIDYABHUSANA.

History of Nadia (from about 900 A. D.)

Navadvipa, which is popularly known as Nadia, is a small town in

Situation of Nadia.

Bengal situated on the river Bhagirathi (Ganges)

at the point of its junction with the Jalangi.

It occupies the north-western part of the Gangetic delta and literally signifies "a new isle." Once it was a very important centre through which trade was carried on by the Bhagirathi between Saptagrama (a port on the river Sarasvati, a little to the north-west of Hugli and nearly 15 Krosas

south of Nadia) and North-western Provinces and by the Jalangi between Saptagrama and Eastern Bengal.

Nearly 4 miles to the east of the modern town of Nadia there is a small village called Suvarna-vihara (golden hermitage) which is often pointed out as the place where the Buddhist Kings of the Pala dynasty used to reside in the days of yore, when a branch of the Bhagirathi, flowing from the north of the modern village Mayapur, rolled below the hermitage. Even now the wrecks of ancient buildings can be found here and there silently testifying to the former grandeur of the place. The decaying stone columns and fragments found here bear clear architectural designs of the Buddhist India, which is taken for a proof that the place was once a temporary resort of the Pala Kings. Relying upon these facts the existence of Nadia can be traced back to the 10th century A. D.

But practically speaking Nadia was unknown in history until it rose to importance for the first time in 1063 A.D. (or Nadia raised to the status of a town under the Sena Kings. rather about 1106 A.D.)* when, according to a local legend cited in the Imperial Gazetteer† of India and the Statistical Account of Bengal‡ it was, in consideration of the sanctity of the Bhagirathi flowing by it, selected by Maharaja Laksmansena of Gauda as the place of his residence. The ruins of the palace of Laksmansena are still extant in Nadia at the south of the village Bilpukur and north of the village Samudragada between the Bhagirathi and Jalangi. About a mile to the north-east of Nadia there is a tank called Ballala Dighi which is said to have been dug by Laksmansena to commemorate the name of his father the famous Ballala Sena.

Laksmansena (1106-1138 A.D.), who raised Nadia to the status of a town, is said to have been a great hero whose prime minister was Halayudha the renowned author of Brahmana-sarvasva, Smṛiti-sarvasva, Mimamsa-Sarvasva, and Nyaya-Sarvasva. The court § of Laksmansena was also adorned by Pasupati, the

* W. W. Hunter's Imperial Gazetteer of India, Vol. VII, p. 13.

† W. W. Hunter's "Statistical account of Bengal," Vol. II, p. 142.

‡ Laksmansena is said to have reigned in Bengal between 1106 A. D.—1138 A. D. For the date of the kings of the Sena dynasty vide Rajendra Lal Mitra's Indo-Aryana, Vol. II., p. 259.

§ Vatu Dasa was the general of the army of Laksmansena. His son Sridhara Dasa who wrote a book named Sadukti karnamrita in 1205 A. D. has mentioned many of the learned men of his time.

eldest brother of Halayudha, who wrote a treatise on Hindu ceremonials called Pasupati-paddhati. Sulapani the reputed autor of Smriti-viveka, Jayadeva the well-known author of Gitagovinda, Dhoyi the author of Pavana-duta and Umapati the poet who made "language to spront into luxuriant foliage"—all flourished in the court of Laksmena Sena.

Though Laksmena Sena resided in Nadia he greatly embellished the city Nadia conquered by the of Gauda which was the capital of Bengal at Mahomedans. that time and was called Laksmenavati or Lakhnauti after his name. Laksmena Sena was succeeded by Madhava Sena (1138-39), Kesava Sena (1139) and Laksmeneya Sena *alias* Asoka Sena (1139-1205 A.D.) respectively. The last king named Laksmeneya designated by Mahomedan writers as Laksmeniya, was overthrown by Mahammad Bakhtiar Khiliji and was forced to run away to Vikramapura in Eastern Bengal about 1203 A.D. Bakhtiar Khiliji, who marched with his troops from Behar to Nadia, plundered the latter town, and placing a Kazi there to look after its internal administration, himself proceeded to Gauda which he conquered. Subduing Gauda he chose it as the capital of whole Bengal which he ruled upto 1205 A.D. The Mahomedans exercised an undisputed authority over Bengal up to 1757 A.D. when the battle of Plassey took place and the country came into the possession of the British.

A University established at Nadia.

(ABOUT 1450 A.D.)

During the Mahomedan rule from 1203 to 1757 A.D., Nadia became the greatest centre of Hindu learning in Bengal. The Nucleus of a University at Nadia. In the 15th century A.D. the nucleus of a university was formed here. It is not known how much aid was directly given by the Mahomedan rulers towards the formation of this university but it cannot be denied that they having expelled the Buddhists from the corners of Bengal and having stood as safeguards against all foreign invaders, enabled the Brahmans to lay the foundation of this new university on strictly orthodox Hindu principles.

Before the rise of the Nadia University in Bengal there were two famous Universities in Behar, *viz.* the Buddhist University of Vikramasila and the Brahmanic University of Mithila. Decay of the universities of Vikramasila and Mithila. Vikramasila is said to have been burnt and destroyed by Bakhtiar Khiliji about 1203 A.D. when he marched from Behar towards Nadia, while the glory of the University of Mithila was extinguished by

the energy of the rising scholars of Nadia. Mithila, which was a principal seat of Hindu learning in the 14th century A.D. was the resort of a large number of students who flocked there from all parts of India to study specially the Nyaya philosophy (Logic). Knowing her importance Mithila guarded with extreme care and even jealousy her own teachings and did not permit any student to take away any logical book or even the notes of lectures delivered there. Students were allowed to go away only with their diplomas. This caused a great disadvantage to the study and teaching of Logic outside Mithila. This great inconvenience was at last removed by Vasudeva Sarvabhauma of Nadia.

PROFESSORS OF LOGIC IN THE UNIVERSITY OF NADIA.*

Vasudeva Sarvabhanma.

(ABOUT 1450-1525 A.D.)

Vasudeva was born at Nadia in the middle of the 15th century A. D. His father Mahesvara Visarada gave him a sound education in Sanskrit grammar, literature and jurisprudence. With a view to prosecuting his studies in Logic (*Nyaya*) Vasudeva, while about 25 years old, went to Mithila where he was admitted into the academy of Paksadhara Misra the foremost logician of the place at that time. After finishing his studies in Mithila he was subjected to a difficult test called *Salaka-pariksa* "Probe-examination" in the course of which he had to explain any leaf of a manuscript that was pierced last by the probe while it was penetrated into the manuscript. One by one he explained one hundred such leaves and his teacher was so much pleased that he conferred on him the title of Sarvabhauma.

Finding that the Professors of Mithila did not allow outsiders to copy their works on Logic, Vasudeva committed to memory the entire *Tattva-cintamani* and the metrical portion of the *Kusumanjali*, and being afraid that his life would be in danger on the way back from Mithila, he in the pretext of coming to Nadia went secretly to Benares where he for some time studied the Vedanta philosophy and returned home at the close of the 15th century A. D.

* My information on this subject is mainly derived from traditions prevalent at Nadia and also from the vast collection of manuscripts on Modern Logic deposited in the Library of the Asiatic Society of Bengal. I have also frequently consulted a very excellent work in Bengali called *Navadvipamahima* by Kanti Chandra Rarhi.

Having transcribed the above mentioned two works from memory, Vasudeva set up the first great academy of Logic in Nadia where students flocked in large numbers. He had four distinguished pupils, viz. Raghunatha Siromani the highest authority on Modern Logic, Raghunandana the founder of the Bengal school of Hindu Law, Krishnananda Agama-vagisa the first expounder of Tantras (Charms) in Bengal and Chaitanya the founder of Vaisnavism in Bengal. At his old age Vasudeva is said to have accepted the Vaisnava tenets preached by his pupil Chaitanya. He passed the closing portion of his life in Orissa where he was patronised by king Gajapati Pratapa Rudra about 1520 A. D.* He was the author of a work on Logic called **Sarvabhauma Nirukti**.

Though an academy of Logic was thus for the first time opened out of Mithila and schools of it gradually multiplied in the heart of Bengal, all was not gained. It yet remained for the academies of Nadia to acquire a university character and authority. To procure that power for Nadia, it was necessary that a representative of it should vanquish the teachers of Mithila in philosophical controversy. That honour it was reserved for the genius and patriotic perseverance of Raghunath Siromani to win for his country.

Raghunath Siromani.

(1477 A. D.-1547 A. D.)

Raghunath was born in Nadia about the year 1477 A. D. While he was about 4 years old he lost his father. His mother supported him with the greatest difficulty. While a boy of five years Raghunath once at the order of his mother had to fetch fire from the academy. He did not take with him any vessel for carrying fire on. Accordingly when a student in the academy offered him a spoonful of blazing charcoal, Raghunath instantly picked out a handful of sand on which he asked the charcoal to be placed. Vasudeva Sarvabhauma being astonished at his marvellous presence of mind and thinking that some extraordinary work was reserved to be done by him, took up the entire charge of maintaining and educating the boy. While Raghunath began to learn the consonants he used to ask why *K* should precede *Kh*, and his teacher had to explain to him the rules of phonetics and grammar along with the alphabet. After finishing grammar, literature, lexicon and jurisprudence, Raghunath began assiduously to study Logic under Vasudeva Sarvabhauma and discussed with him the knotty points of

* Vide L. 2854, Rajendra Lal Mitra's Notices of Sanskrit mss., Vols. I—IX, Sastri X—XI.

that branch of learning. He used sometimes to sit in deep meditation on problems of Logic under banyan trees in the neighbouring field which he did not quit until his doubts were cleared. Soon he surpassed his teacher in many respects, and demonstrated the worthlessness of the latter's commentary on Logic. To exact a charter for the academy of Nadia to confer degrees, Raghunath went with the permission of Vasudeva Sarvabhauma to Mithila in the disguise of a pupil and entered into the academy of the famous Professor Paksadhara Misra who was still alive. Raghunath who was blind of one eye was ridiculed by the students of the academy thus :—

“ Indra is thousand-eyed, Siva is three eyed, all others are two-eyed, verily who art thou one-eyed ? ”

However getting admittance into the academy Raghunath very soon demonstrated his own worth and was promoted to the highest class. The teacher found him a hard pupil to deal with, and many were the controversies the brilliant pupil carried on with him. Matters soon came to a crisis. One day in the course of a hot and protracted disputation before all the numerous students and doctors, the renowned teacher, foiled and exasperated, insulted his brilliant pupil-polemic with the savagery of a schoolman. Raghunath's nature rebelled against the treatment he had received—treatment undeserved by him and unworthy of the teacher. Brooding in silence over his wrongs, Raghunath's proud nature proposed vengeance on his adversary, teacher no longer. That very night, armed with a drawn sword he went and hid himself in Paksadhar's house. At mid-night thinking the moment opportune, he went up the stairs and looking about descried Paksadhara lounging on the terrace with his wife at his side. Raghunatha staggered in his fell purpose. It was a most glorious night in autumn when the full moon was shining in all her glory. The sky was serene and transparent and all nature was hushed. All were happy save the two unfortunate logicians—one brooding sadly on the imminent loss of his reputation and the other sorely anxious to achieve a glory for himself. The young murderous logician was perplexed for a while but instantly rushed in fury from his hiding place towards the couple. Suddenly he stopped. He was no hardened old sinner. He paused to listen. As the teacher and his wife were gazing at the full moon the wife admired her beauty and asked her husband saying : “ My Lord ! is there anything bright as this grand queen of the night ? ” The teacher replied : “ There is one thing, my dear, which is quite as bright and more so ; I was all the whole evening thinking of such a thing ; there has come from Bengal

Charter obtained by Raghunatha for Nadia to confer degrees.

a young logician who has for some time been a difficulty at Mithila. He has this morning vanquished me by an obstinately conducted argument. His intellect, in my opinion, is more luminous than the full moon herself." Raghunatha overheard this conversation. The sword fell from his involuntarily opened palm, and he came and fell at the feet of his startled teacher. Paksadhara forgave him and embraced him warmly, and at the next morning before the entire academy confessed himself beaten by the young Bengali logician. This confession in fact entitled Raghunatha to confer degrees. His triumph took place about the year 1503 A. D. from which the foundation of the university of Nadia is reckoned. On his return he established a college at Nadia. He died about 1547 A.D. at the age of 70 years.

A Word to the Wise.

(BY PROFESSOR ALEXANDER TOMORY).

The events of the last two years have made a deep impression on the generous minds of students in Bengal. Into the welter of words and phrases and academic thoughts that used to fill the brains of students there has entered a new element. Ideas and ideals of civic life have displaced the passionless facts and notions of College training. Feverish tension has been imported into the groves of Academe.

It would be foolish to reprobate this change. Anything is better than dull lifeless routine. The mechanical acquisition of knowledge in class rooms has been too frequently the whole meaning of student life in Bengal. During the last two years this has been completely changed.

The realisation of a national Self-consciousness has begun. Whither shall it tend? Much depends on the attitude of the educated middle classes from whom students spring and whose numbers they afterwards swell. In the Cycle of the ages the Orient which was the light-bringer to the West is kindling again. Ideas that have found currency in the West are becoming incorporated in its mysterious spiritual nature and are tending to produce a new creation, viz., a democratic Orient. Shallow critics may condemn the movement as foreign and unnatural; but if there is any probability in such matters it would seem as if the modernisation of Japan and the reputed awakening of China would be reproduced in India.

In this resurrection of ancient India the educated middle class will have a leading place. If they follow the natural evolution that time and opportunity

permit we may expect a revived India developing along the lines that have resulted already in the formation of a self-respecting community that owes everything to intellect and not to the accident of birth. Contrast the India of to-day with the India of the mutiny and you will observe how the centre of gravity of social influence has altered. A new race has arisen more deeply impressed with its own rights and position than with the historical development of the land that bore them. The older race of influential leaders while retaining their supremacy as lords of the soil have not held the political supremacy, which has fallen into other hands. The future of India is bright with hope if principles of justice between its various races prevail. Such principles are more easily dreamt about than defined and applied. But probably at the present stage it will be found that a foreign nation will hold the scales more evenly between the rival races and their competing interests than any representatives that were available from either or both of the rivals.

The co-operation of Britain and its guiding sense of justice seems to be needed still to lead the Indian nation to its goal. Primary education, free and compulsory, must be the first undertaking. The illiteracy of India is an insult to its sublime Past, a stain upon its administration, and a menace to its future. A land that has about 95 percent of illiteracy is frankly, not yet fit to rule itself. In 30 years compulsory free education would immensely increase the capacity for civil life among the millions who are at present not only dumb but paralysed. That is the first undertaking: and the co-operation of Government and landowners and rich middle classes will be required to achieve this Herculean task.

The other feature of the evolution of India is Industrial development. In 20 years Calcutta mills have brought a new community to the banks of the Hughli, and have immensely increased the wage earning capacity of the workers employed. In the same time Cawnpore and Delhi have become commercial centres of great importance. Natural development will in time complete the industrial revolution of India. But it may be considerably accelerated if educated men turn their talents into practical directions. It would be much better both for the men themselves and for their country if those who are at present struggling pleaders earning a living at the bar with difficulty were to become managers of industrial undertakings. If one-third of the present B. L. candidates spent their two years in learning the technical side of some industry they would make better managers of a trade than they will ever make pleaders. A race of competent sagacious business men would soon elicit capital from Indian sources for Indian concerns. Hitherto British capital has had to bear the burden of exploiting Indian

industries, but there is room for all the capital that Britain and India can pour into the Empire.

In the meantime students have their duty clearly before them. The new Regulations of Calcutta University put greater burdens on Colleges but improve the lot of students. The simplified courses with the larger number of options allowed will afford ample opportunities for more extended study than the old regime provided. At the same time the number of students will probably be reduced by the higher standard imposed. Those who survive the new matriculation test will find a more expansive and inspiring student life awaiting them than their predecessors ever enjoyed.

The future is full of promise. The call of country is sounding and is awakening a glad response in many hearts. The opportunities of study are increasing and its rewards are multiplying. The profession of education is becoming more inviting. Arts and industries afford openings for promising young men of ability and character. India's rejuvenescence is commencing, and who shall say what her future shall be ?

ALEX. TOMORY.

The Problem of Education.

The problem of education is now engaging the serious attention of those who have realised the difficulty of getting their children properly educated under the present system. A great majority of the people desire to give their children, through education, a better chance in life than they themselves have had. The Government and the educational authorities here seem to have awakened to the sense of responsibility in the matter of imparting education to the children of the soil in such a manner as to fit them for better chances in life, in view of the struggle for existence which threatens to be more and more serious day by day. Every educational policy, which is not self-condemned and inoperative, must be based upon utilitarian considerations. "Education is the preparation for complete living" says Herbert Spencer; and this is no less true in the life of nations than in the life of the individuals. In fact education has been recognised as the most potent force in the never-ending and ever acute struggle for survival among nations.

Great changes and reforms indeed have been inaugurated by the remodelled University, but they have been to a large extent undertaken under the pressure of the Government,—I cannot say there was no popular demand—and have resulted in compromises between popular needs and Western ideals.

THE PROBLEM OF EDUCATION.

The education imparted in this country for more than half a century has left much to be desired. Lord Curzon, in his convocation speech, characterised it as producing a "hybrid civilisation and bastard morality". There is no doubt, however, that the result fell far short of what might be expected. Whether the new University Code will succeed in grappling with the difficult problem of education in this country remains to be seen. But it is very doubtful whether the situation has been clearly grasped, or at any rate, whether any serious attempt has been made to define precisely a central organising principle on which the educational method should be based if it is to be sound at all. I urge the necessity of recognising this supreme need of a central principle especially as the difficulties that usually beset any attempt at discovering the method of education are considerably multiplied in this country by the questions of environment, tradition, race and creed. Besides, here the school and the college have to some extent to take up the proper work of the home, when they ought to be occupied with other things. Would that the homes were all good!

Every people has its own laws of mental development determined by internal and external conditions. A system of education which proceeds on an ignorance of these conditions defeats its own end. In India the question becomes one of peculiar complexity on account of the presence of two conflicting ideals, Eastern and Western, which fate has drawn together for good or for evil. So far as I am aware, no adequate philosophical enquiry has been made into the aims of education, into the relative merits of the various studies, and into their adaptability to nurture mental, moral and physical qualities of the children of this country. The Germans have gone deeply into this problem. Some of Germany's able thinkers like Herbert, Rein and others have given their best years to the study of relative educational values and to a working out of its results. There are so many influences growing around us at the present time that a revision of the educational method will ere long be felt as an imperative need; for the development of industry and commerce has education for its backbone.

Education principally aims at moral perfection or as Stein puts it, at "the harmonious and equable evolution of the human faculties by a method based upon the nature of the mind for developing all the faculties of the soul" (see Bankim Chandra's *Chandrasekhar*). But it is difficult at the present time to set up the moral aim as a supreme one in education and to grasp clearly the instrumentalities by which it can be realised. Times have changed and the circumstances and the ideals have changed too. The rule of thumb or profit occupies a prominent place in our consciousness now, and Plato's ideal of Education as the beauty and perfection of the soul is apt to

industries. Regarded to the lumber-room of philosophical speculation. The manner in which these two ideals can be combined, as in fact they should be combined, is a practical question—a question of method. And a solution of this question for a particular people, with a tradition of the past, is possible only on the basis of a knowledge of the habits, temperament and aspirations of the people and its relation to surrounding nature.

K. M.

WHAT'S IN GAMES?

(By PROFESSOR H. ARMITSTEAD OF THE PRESIDENCY COLLEGE).

In a leaderette in one of the Calcutta dailies, some few months ago, I read that old-fashioned Hindus considered games denationalising in so far as the average Indian youth was not fitted for the physical strain involved in English out-door games. Whether the statement be true or not, nothing is more remarkable than the way in which young India has taken to outdoor games. Personally, I think, there is little to be gained by discouraging in the younger generation aversion to games, which appeal with such enthusiasm to more virile races. A little thought would soon prove that games gave lessons in order, organisation, concerted action, &c; qualities that lie at the basis of or national greatness. The athletic ground is as essential to a proper and efficient education as the schoolroom or college class room itself. It is the workshop for the manufacture of the sound body, as the classroom is for the sound mind; it is a fine training ground for the emotions; it is a great leveller and compensating force; for the dullard may be a physical adept. He wins in the playground respect which he can't attain in the college; for muscle is worshipped as much as brain. The bully is checked, the timid and shy get nerve, confidence, and self-control. And now let us see what there is in games. There is a great deal. To exhaust all the points would require a larger space than the magazine can spare. So I shall deal briefly with a few of them.

Games afford a sane outlet for physical energy. They are a healthy agency for the overflow of that abundant spontaneity of youth life, which may become so troublesome to discipline, if not regulated. Pursued in moderation, games develop the muscles, and strengthen the lungs. The general appearance is improved by the purification of

WHAT'S IN GAMES.

the blood through the larger consumption of oxygen, & the element derived from games increases health. Students particularly, often get into moods of depression through over-study—those mopish moments, which come oftener than they ought to do. They lie like shadows on the spirit's surface, turning to monotone what should be all iridescence. Now, a change of thought involved in games would afford great relief after mental work.

Æsthetic effects loom largely in games. The senses are exercised to no mean degree—sight, hearing, and intellect are based upon sense impressions, a fact known to the humblest psychologist. And these get liberal scope for development in all branches of sport. Athletics give a fine outlet for competitive spirit. They also inculcate obedience to law, honour and courtesy, sense of membership with others. Among other things, "to play the game," "to give and take," to devote themselves to, and efface themselves for a common cause, to feel pride in the achievements of others, to accept victory with becoming modesty and defeat with due composure, and speaking generally, to acquire the spirit of corporate life and of fair play will be learnt. Originality is given a wide field, and adaptability which is a great training, to new conditions and circumstances is often allowed a large range.

If only for economical reasons, games are worth playing. See recreation is very profitable from a health point of view. Games enable one to be healthy even in unhealthy surroundings. Good character proven in athletics often secures a good position in business. The manly fellow on the playing grounds is a manly fellow in the office. Where, too, can social effects be better noticed than on the athletic ground? There always exists sympathy between individuals and classes. One has only to take part in a game on board ship, or a village cricket match, to see the wonderful levelling influence of games. In India we get good examples. Many Maharajahs play cricket with their poorest neighbours. On the ground the Maharajahs drop their stiffness of manner. Each and every player is treated with respect such as only sportsmen know.

The prospective value of games should not be forgotten. After a career in athletics, be it one of great fame or not, the mind is stored with healthy and honourable memories to help the future character. And last, but not least, point is the general tone of health of a genera-

Every man has a duty to perform. His nation rightly demands it of him. It is a deep moral obligation to maintain good health; for the health of one generation is most important for the health of the next. And now, I close with the plea for "a sound mind in a sound body".

H. ARMITSTEAD.

A few lessons of a short trip to England.

(BY DR. INDUMADHAB MULLICK.)

No one who has travelled from India to England can fail to be struck by the difference which the countries he passes through present to his own country—specially the last one, namely—England. Yet there is a graduation by which the intermediate countries get a more and more occidental character by slow degrees as we pass from the east towards the west. Thus Aden is pretty nearly an Indian province, while Egypt is somewhat different. The southern races of Europe have many of the oriental characteristics—Italian music, complexion, and features as much resemble those of the Indians as of the British. The French people are oriental in sentiment—very often with black hair and a pale white complexion, due to their having largely intermixed with the southern races of Europe such as the Spaniards and the Italians. Their fair complexion is quite unlike the rosy complexion of the English.

In the dawn of history civilization spread through this way gradually from east to west; just like the diurnal motion of the sun.—Egypt, Phenicia, Babylon, Greece, Rome and Spain, amongst which perhaps may also be mentioned Persia and India. Now it is reigning supreme in the western-most island of the old world.

Another point which forcibly strikes an observer is the solid build of the steps between India and England in the shape of the different strongly defended seaports each guarding the inlet and the outlet of every important sea or straight or canal and channels of communication. Thus Aden stands at the entrance to the Red Sea and Egypt at its outlet. Malta in the middle of the Mediterranean, Gibraltar at its exit. Although so far away from each other these serve to the great naval race as steps between England and its Eastern dependencies. So is also the case on the far east, thus Burma, Penang, Singapur, Hongkong are on the way to the Chinese and Japanese quarters.

A FEW LESSONS OF A SHORT TRIP TO E

The chalk cliffs of Dover are only two hours' journey across the channel which was the home for exploits of the daring vikings of old, and through which the Roman galleys of Julius Caesar sailed and the giant ships of the Spanish Armada were distressed by the soft and quick-sailing fireships of England. As regards the island itself—it is a mere speck on the surface of the earth, only one thousandth portion of the area of the kingdom it rules, a snug little seagirt place comfortably situated away from the strife of neighbours in the continent. A climate extremely variable, which has served the unique purpose of rendering the race hardy and fit for any climate in the world, for colonisation and rule—the home of a virile race, with intellect and activity readily rising in response to any difficulties of the surroundings, with a rich store of coal and iron side by side, whereby the industrial art, the most lucrative of all arts, naturally developed and enriched the people by stimulating their activity in that particular direction. Both coal and iron being so plentiful engines were manufactured of different kinds and in large numbers thus constituting nearly seven-eighths of the shipping of the world with as many coaling stations on different seas and rivers of the globe. The manufacturing art is here at its climax and wealth has flown in from all directions. Population has increased by leaps and bounds and the excess of people, who are at the very home, acclimatised to all change in the weather, went out to settle in foreign lands and establish successful colonies there; while the excess of produce led to the conquering of foreign lands for market. All this could make possible such a vast kingdom under one rule and so harmonious together.

Race after race have fought in and settled and fused blood so freely that no trace of any distinction is seen now. The blood thus freshened has maintained the energy and vigour of the race as an youthful nation. What a marked contrast there is in this respect to the condition of India ever since olden times up to the present date. In and in breeding has sapped all strength and that is why she is so low.

Of all the races that I have seen in Europe during my short visit—and in cosmopolitan countries like England there are many such races coming and going or settled—I have not seen one more aristocratic looking with all the grace of dignity and wealth. This fact is so well marked that it at once strikes an observer while stepping from France to England the whole land has a look of plenty and the very look of the people is serious and practical.

There is unity and uniformity, order and peace in every nook and corner of England. The town which is the busiest metropolis in the world has

industries, of carriage accidents. The tall and stalwart policeman, that stands on the road directing all movement of the street with a single wave of his hand, is a very exemplar of his class. The houses are all neatly built with an eye both to the æsthetic effect and utility, even the streets are paved according to a well considered plan of huge traffic—some are of wood to prevent noise with a landing station at the middle for men to rest on their way across. The appearance of the street is as busy as that of an anthill. I can only compare it to a place, I saw in the narrow street of Hongkong. Every one walks serious and in a true business-like hurry but still when a stranger asks the way whether in the busy street or the shop or in the office room they are always ready for help. The answers are as short, definite and precise as can be expected from a practical man.

The history of England is all written down in the shape of statues and tablets in commemoration of its heroes. The English are very fond of mottoes inscribed on statues buildings and stones embodying general principles of truth and justice and mercy. The kings of robing room in the house of Parliament, so are the tablets at Trafalgar Square and so are the house tops at the New Bailill. No one who has not seen London personally can form an idea of the open spaces and parks and squares of the metropolis that will fence twice as much people as Calcutta contains—the place which is full of palaces is also full of plants and flowers. Every plot of ground available is a garden and windows are filled with flowerpots in which bright coloured and sweet scented flowers bloom as luxuriantly as they do in the soil. As a race they are great lovers of flowers and of fresh air and outdoor life. There is scarcely an occasion which is missed when one can afford such a thing. Even in places thickly populated such as the Oxford circuit there are squares all round where people by hundreds sit and enjoy day and night. Every Saturday and Sunday are excursion days when fares are considerably reduced for giving facility to townspeople to go out of town.

Then as regards the peculiar features of that cold climate. As I have already said it is very changeful—drizzle and sunshine following in quick succession but human intellect has braved its effects by devising suitable wearing apparels for the same. Otherwise it is so agreeably cold and bracing that even hard work scarcely brings on a sense of fatigue—in fact sedentary life is wellnigh rendered impossible in cold climate: hence the nation is so active and their body so muscular and destitute of superfluous fat. The mental temperament is an exact reflection of agile body and an inborn optimism, energy and joyful spirit pervades throughout the people. Naturally they are great lovers of comedy and fun. They dislike tragedy

A FEW LESSONS OF A SHORT TRIP TO EN

and their actors cannot perform a tragic part half so successfully : form comic parts, the evident reason being a race or an individual that has never wept can never weep in play.—just the opposite is the case with us. Out of 48 theatres in London in one night there were only two tragedies played and even of those two I liked none when I saw them. The dance walk and other recreations are too fatiguing to please us.

Then about the most characteristic feature of the race—the spirit of freedom and equality. The rights and liberties of females is a remarkable factor and has been the most potent cause of their national greatness. They are educated and free and capable of all works which can make home comfortable and economical and ensure the proper education of boys and girls. What a difference there is in this respect with us, there lies the keynote of a nation's prosperity which we have failed to see.

There is yet another as important a fact which we should draw attention to, that is about the nice way of reading and education of children. Children are taken well care of even from as early an age as three, by schools provided by the state. Primary education is free and compulsory but that begins at the age of seven and ends at fourteen. Since the year 1870 Education has been reorganised on a rational basis and since then the general moral tone of the country has considerably improved ; whereas formerly only 70 per cent could read and write ; now there is none that cannot. Crime has greatly diminished along with drunkenness.

Every provision is made for all round healthy surroundings in every and corner of London. Any unhygienic house is at once demolished, all infectious cases are at once removed and segregated. Food supply is scrupulously pure and unadulterated. The effect of all these precautions shows itself in the remarkable diminution of disease and death and the general health and vigour of the people, and the consequent greatness of the race.

Another extremely remarkable phenomenon in connection with this is the fact that even with wellmarked congenital bone deformity which indicates tubercular lesions at birth children ultimately regain perfect health and vigour through the allround healthy surroundings of the place. There are no untimely fatal and debilitating illnesses in the land much to speak of. In other words the curve of life of the individuals in their case is an ascending curve *i. e.* even those born unhealthy get healthier by staying in the climate whereas in our country it is a descending curve, healthy persons break down before their age. Individuals and the state should combine this in one country as they have done there.

There are certain diseases particularly common in them. Tubercle is perhaps ten times as common as it is in our country, but skin gland bone or

industries, that the more often affected than lungs as in our country. Tubercle does not affect their nutrition so much as it does ours. It generally remains as a local trouble and less often affects the general system. Why is this so? Is it due to the natural resistance of the able bodied men being greater than ours? Even in cases of extensive local tubercle you can seldom find a man so wasted and ghastly thin as is so common amongst us. In other words they suffer more often from disorders of excretion than from diseases of nutrition whereas the reverse is the case with us. Englishmen are good eaters of unadulterated, simply cooked, easily digested, highly nitrogenous, less bulky foodstuff. There are good and cheap restaurants at every cover of the street to which people largely resort. Undoubtedly this is a great factor of the health of the race, which is so wanting in our country in every possible way.

Along with the spirit of activity and progress there is a dignity of honest labour in that land. How unlike is the case with us. It is an industrial country and that industry has brought on its natural prosperity.

I have not seen a more heavenly place on earth than the evening fire side of an English home. The great English poet of domestic virtues wrote—

Now trim the fire,
And close the shutters fast,

Let fall the curtain,
wheel the sofa round."

One actually comes across such a sight of comfortable home. You will actually see this picture before you—a good dame with her neat healthy happy young charges skipping around her, sitting close to the lord of the house who after the honest labour of the day is now resting on an easy chair by this fire side and while the four eyes are meeting and glittering with joy, and the lips showering sweet words,—her ever-busy hands are actively knitting an article of domestic economy.

Every one ought to visit the land as a place of pilgrimage and any expense or trouble or privation would be amply repaid by the useful knowledge and the healthy stimulus gained by actually coming in contact with a people full of life and prosperity.

NOTES AND COMMENTS.

NOTES AND COMMENTS.

Representation of Graduates in the University:—The fact that the “registered graduates” of the University will be very soon called upon to elect two members to represent them on the Senate gives rise to one or two simple reflections. The election of Fellows by graduates is no new thing, but the University has clearly taken a step in advance by insisting upon registration as a condition of voting. (Would only that the fee charged for the purpose had not been made almost so prohibitive !) This means organization, and it is for the graduates themselves to see that the organization is really effective. The whole tendency of things is towards corporate life, where before there were only scattered atoms. Without corporate life, representation seems almost meaningless. In demanding registration and giving a variety of privileges to the “registered graduates” the University clearly means that the vote of the graduates is henceforth intended not simply to confer a personal distinction (how difficult and how invidious a task from the point of view of the voter himself !) but to mark out the men every year, who are in closest touch with, and the best exponents of the thoughts, views, needs &c of the graduates as a body. The relation of the graduates with their representatives must henceforth be not momentary and accidental, but continuous and in some degree reciprocal. This is possible only with the growth of a true corporate life. Here for the graduates to realize that they are a part of the University, for them to devise means whereby they can be in thorough intellectual inter-communion with the University. Thus alone will the privilege of representation have that educative effect which is its highest end. The thing cannot be expected to come all at once, and voting at the next election must necessarily be more or less a matter of pure personal preference, as it has to be in connection with certain other elections also, but it may be hoped that this will be the beginning of a process which shall result in making the system of representation a reality and an educative power in the University.

Devanagara—An illustrated monthly journal is published under the auspices of an Association, called the Ekalipi—Vistaraparishad. This Association, which is composed of Bengalis, Beharis, Marwaris, Marhattis, Gujratis &c, has for its object, as the name implies, the adoption of a *Common script* for the whole of India. The languages of the different provinces of this vast country are directly or indirectly, the offshoots of one and the same mother language, *Sanskrit*, which was and still is, written in the Devanagara character,

that many (the shoots) have assumed various forms showing that they have no relation with one another. Hence the originators of the Association have thought it fit to adopt the Devanagari, the character of the mother language, as the Universal script for India. It is apparent that its object is literary and not political, as it aims at bringing the literary treasures in each dialect in each province within the easy reach of the reading public and establishing a universal medium of communication throughout India. The get up is attractive, and some of the illustrations are good. The reading matter also, so far as we can judge of it, is simple and judiciously selected. The magazine will serve an excellent purpose if it familiarizes the people of the different provinces not only with a common script but also, to some extent, with each other's dialects and literatures.

K. P. B.

The Japanese Imperial Rescript on Education :—The central principle and mainspring of Japanese education, as explained by Baron Kikuchi in his inaugural address to the course of lectures on Japanese education before the University of London, is to be found in this very characteristic "Imperial Rescript." The Rescript opens thus :

"Know ye, our subjects : Our Imperial Ancestors have founded Our Empire on a basis broad and everlasting, and have deeply and firmly implanted it in us ; Our subjects ever united in loyalty and filial piety have from generation to generation illustrated the beauty thereof. This is the bloom of the fundamental character of Our Empire, and *herein also lies the source of our Education.*"

The cardinal virtues, explains Baron Kikuchi, which are pre-eminently put forward are loyalty to the Emperor, with which is identified patriotism to the state, and filial piety, including therein not only duties due to one's parents, but to ancestors in general ; all the rest may be regarded as the outcome of these two.

The "Rescript" thus further develops the educational ideal :

"Ye, our subjects, be filial to your parents, affectionate to your brothers and sisters ; as husbands and wives be harmonious, as friends true ; bear yourselves in modesty and moderation ; extend your benevolence to all ; pursue learning and cultivate arts, and thereby develop intellectual faculties and perfect moral powers ; furthermore, advance public good and promote common interests ; always respect the Constitution and observe the laws ; should emergency arise, offer yourselves courageously to the state ; and thus guard and maintain the prosperity of Our Imperial Throne coeval with heaven and earth. So shall ye not only be Our good and faithful subjects, but render illustrious the best traditions of your fore-fathers."

NOTES AND COMMENTS.

In Japanese schools, when masters and pupils assemble in school, at the beginning of a school session or term, to celebrate the Year's day or other fete days, it is usual to commence the proceedings with the reading of this Imperial Rescript. This is no empty ceremony ; the reader, who is usually the Principal, feels that he is giving the living words of his Majesty the Emperor ; the assembly stands up, and when the reading is over, all bow in profound reverence, as if they had been delivered by the Emperor in person.

The Spirit of true Art and its place in University Education :—The following extracts from an article contributed by Mr. Havell to the Nineteenth century will appeal to the thoughtful as deeply suggestive :

"Indian Universities, like their European models, are unanimous in excluding art. Indian Universities, with the unerring short-sightedness of the copyist, have exaggerated the defects of the older English Universities to the point of caricature. The many excellences of English college-culture are too well advertised by its votaries to need mention. Indian Universities have only recognized its faults—the aloofness from the national life and want of breadth. Inversely, Oxford has attempted to reproduce Greek culture by composing Greek odes and essays—ignoring the fact that it was based on the cultivation of the aesthetic faculties and a profound study of human nature—while Japan has caught the true spirit of it in not attempting an imitation.

"Lord Curzon has given Indian Universities a new machinery have now to work out their own salvation with it, and are apparently to restore Indian culture on a basis of modern science. The idea that teaching Indian schoolboys a smattering of modern experimental science will be a revelation to a culture and civilization which constructed a theory of the Universe, based on what we call modern scientific principles, five thousand years ago, must make Swadeshi laugh in its sleeves. The Greeks believed that by teaching their children to love God's beauty in Nature they would help them to bring beauty into their daily lives. They thus found what modern educationists are always looking for—a religion without dogma. Every national art since the world began expresses the same sentiment. In Europe we still believe in beauty to a certain extent, provided that it is archaeologically correct. In India we only believe in unadulterated ugliness and moral text-books. The Greeks understood that by the study of nature and of art they were developing the powers of observation and the powers of original thought, as art represents the creative faculties developed through the observation of nature. Greek education therefore was a system of national culture based on national life and art. The present

Industries. The art system is a system of pedagogics based on narrow utilitarianism.

"The artistic sense is the essence of real culture. Homer, Shakespeare, and the Mahabharata, products of national life and art, will live when most of our college-made culture is lost in the limbo of time. But art as the vitalising influence in national culture is as little understood by Indian Universities as it is by departmentalism. The art faculty only exists as part of the University machinery. Swadeshi in Bengal has raised a cry for a national University. Though there may be sedition in the cry, there is none in the idea itself; it is the ideal for which all Indian educationists must aim. A real national University would solve the greatest difficulty of Indian education, the question of religion. However suitable it may be for the Western social and political system to exclude religion from State education, the idea is and always will be utterly incomprehensible and abhorrent to the East.

"It may be that art is merely a matter of sentiment; but sentiment has brought Japan where she is today, and if the centuries can be trusted, sentiment rules the world. The bigotry of Aurangzebe destroyed the art of the Moguls and broke up the empire which the sword of Babar and the statesmanship of Akbar founded. Is there not a danger to the Empire which Warren Hastings, Clive, Wellesley, and Dalhousie won for us in the short-sighted departmentalism which crushes out the spirituality of the people?"

The Mozoomdar Memorial :—The foundation of the Calcutta University Institute is specially connected with the name of the late Rev. Pratap Chunder Mozoomdar, and it is satisfactory to note that the appeal of the Institute for funds to perpetuate his memory has met with a generous response. The total amount realized is a little over Rs. 2600, and the Memorial Committee decided to devote the best portion of it (Rs. 1500) to the foundation of an annual gold medal under the University to be awarded to the student who gets the highest place at the B. A. Honours Examination in Natural Theology. This offer has been accepted by the Syndicate. The balance of the Fund has been placed at the disposal of the Institute Committee for the purpose of founding an annual prize to be competed for by undergraduates and awarded to the writer of the best essay in Bengalee on some religious subject, and also for having a portrait and a memorial tablet to be put up in the Institute hall. A certain amount has also been granted for erecting an ornamental canopy over and meeting some other small expenses in connection with the *Samādhi* (monument) of Mr. Mozoomdar in the compound of Peace Cottage.

CALCUTTA UNIVERSITY INTELLIGENCE.

Representative on the Bengal Legislative Council :—Babu Devaprasad Sarvadhikari M. A., B. L., has been elected, in the place of Babu Bhupendra Nath Bose whose term has expired, to represent the Senate on the Bengal Legislative Council.

Third University Reader :—Professor A. Schuster, D. Sc., F. R. S., has been appointed University Reader to deliver a course of lectures on "The Progress of Physics during the last thirty years."

Affiliation :—The Hughli College has been affiliated to the University in Science up to the Intermediate standard in the subjects of Physics and Chemistry.

